| Symbol | Description |
|--|--|
| Constants | |
| T_0 | Temperature of the triple point of water (K) |
| R_v | Vapor constant for water $(J kg^{-1} K^{-1})$ |
| L _{sub} | Latent heat of sublimation of water (Jm^{-3}) |
| Cv0 | Vapor mass concentration at 273.16 K (kg m ⁻³ of air) |
| D _{ice} | Diffusivity of water molecules in solid ice $(m^2 s^{-1})$ |
| $D_{\rm V}$ | Diffusivity of vapor in air at 263 K (m ² s ⁻¹) (temperature dependency neglected) |
| $\rho_{\rm ice}$ | Density of ice $(kg m^{-1})$ |
| u _{GR} | Annual accumulation rate at Dome C. Antarctica (mice eq. yr^{-1}) |
| R _{mov} | Average snow grain radius (m) |
| Δt_{sol} | Characteristic time for solid diffusion (s) |
| $\Delta t_{\text{surf/center}}$ | Periodicity of the mixing between grain center and grain surface because of grain center translation (s) |
| 1-D variables | |
| t | Time (s) |
| Ν | Layer number from top of the snowpack |
| $\delta^{18}O_{sf}(t)$ | Isotopic composition of oxygen in the snowfall (%) |
| $T_{\rm air}(t)$ | Temperature of the air at 2 m (K) |
| 2-D variables | |
| h(t,n) | Height of the center of the snow layer relative to the bottom of the snowpack (m) |
| z(t,n) | Depth of the center of the snow layer (m from surface) |
| dz(t,n) | Thickness of the snow layer (m) |
| I(t,n) | Temperature of the snow layer (K) Density of the snow layer (km^{-3}) |
| $p_{\rm sn}(t,n)$ $m_{\rm cn}(t,n)$ | Mass of the snow layer (kg) |
| $C_{\rm v}(t,n)$ | Vapor mass concentration at saturation in the porosity of the snow layer (kg m ^{-3} of air) |
| $D_{\text{eff}}(t,n)$ | Effective diffusivity of vapor in the layer ($m^2 s^{-1}$) |
| δ^{18} O (t,n) | Isotopic composition of oxygen in the snow layer (%) |
| $F^{18}(n+1 \to n)$ | Flux of the heavy water molecules (¹⁸ O) from layer $n + 1$ to layer n (kg m ⁻² s ⁻¹) |
| $F(n+1 \rightarrow n)$ | Vapor flux from layer $n + 1$ to layer n (kg m ⁻² s ⁻¹) |
| $D_{\text{eff}}(t, n \to n+1)$ | Effective interfacial diffusivity between layers <i>n</i> and $n + 1$ (m ² s ⁻¹) |
| $R_{\rm vap,ini}^{\prime}$ | Isotopic ratio in the initial vapor (<i>i</i> is either ^{16}O , ^{17}O , or D) |
| $R_{\rm surf,ini}^l$ | Isotopic ratio in the grain surface sub-compartment before vapor individualization |
| c ^x _{vap,ini} | Ratio between the mass of a given isotopologue in the initial vapor (x is ${}^{18}O, {}^{17}O, {}^{16}O, {}^{14}H, \text{ or } D$) and the total mass of vapor (no unit). The mass balance is made separately and independently for H and O (i.e., $c_{vap,ini}^{18} + c_{vap,ini}^{17} + c_{vap,ini}^{16} = 1$ |
| | and $c_{\text{vap,ini}}^{IH} + c_{\text{vap,ini}}^{D} = 1$). |
| $\alpha_{\rm sub}^i$ | Fractionation coefficients at equilibrium during sublimation (i is either ¹⁸ O, ¹⁷ O, or D) |
| | Fractionation coefficients during condensation (i is either ¹⁸ O, ¹⁷ O, or D) |
| $\alpha_{\text{cond}}^{\prime}$ | No fractionation |
| α ^r cond,eff | Effective (total) fractionation |
| α ^r cond,kin | Kinetic fractionation only |
| $\alpha'_{\text{cond,eq}}$ | Equilibrium fractionation only |
| m _{vap,ini} | Initial mass of vapor in the porosity (kg) Mass of water in the grain surface sub-compartment before vapor individualization (kg) |
| m _{surf,ini} | Mass of water in the grain surface sub-compartment after vapor individualization (kg) |
| τ | Ratio between the mass of the grain surface compartment and the mass of total grain |
| m _{surf} | Mass of grain surface compartment |
| m _{center} | Mass of grain center compartment |
| m _{vap} | Mass of vapor in the porosity |
| νtot Φ | Porosity of the layer |
| $m_{\rm surf,ini}^{18}$ | Mass of heavy water molecules (¹⁸ O) in the grain surface before vapor individualization (kg) |
| m ¹⁸ _{surf,new} | Mass of heavy water molecules (¹⁸ O) in the grain surface after vapor individualization (kg) |
| D^{18} / D | Ratio of diffusivities between heavy isotope and light isotope |
| $\Delta m_{\rm vap, exc}$ | Mass of vapor in excess in the porosity after vapor transport (kg) |
| $ ho_{ m sn,ini}$ | Density of the snow layer before vapor transport |
| $\rho_{\rm sn,new}$ | Density of the snow layer after vapor transport |
| Lini, Inew | remperature of the show layer before and after valor transport |